

CLAIMS

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- 5 1. A circuit for receiving (or transmitting) microwaves, the circuit comprising radiating means (60; 74; 80; 144) for receiving (or transmitting) microwaves, filter means for eliminating microwaves transmitted (or received) at different frequencies by the radiating means, and means for amplifying received (or transmitted) microwaves, characterized in that it includes at least two filter and amplifier stages (150, 152, 158, 160; 182, 184, 190, 192) connected to the radiating means and respectively comprising a planar filter (150, 158; 182, 190) whose rejectivity for transmit (or receive) frequencies is a fraction, preferably a small fraction, of the total rejection needed to eliminate the transmit (or receive) frequencies and an amplifier (152, 160; 184, 192) whose gain is a fraction of the total gain of the circuit, said filter and amplifier stages applying progressive filtering and amplification.
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- 15 2. A circuit according to claim 1, characterized in that the planar filter (150; 182) of the first (or last) stage (150, 152; 182, 184) is connected directly to the radiating means.
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3. A circuit according to claim 1 ~~or claim 2~~, characterized in that the attenuation of the filter (150; 182) of the first (or last) stage (150, 152; 182, 184) and the gain of the amplifier (152; 184) of that stage have values such that the amplifier is not delinearized by residual transmit (or receive) signals not eliminated by the associated filter.
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- 30 a 4. A circuit according to ~~any of claims 1 to 3~~, characterized in that the total rejectivity needed to eliminate the transmit (or receive) frequencies is in the order of 50 dB and the rejectivity of the filter (150; 182) of the first (or last) stage (150, 152; 182, 184) is
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in the order of 14 dB.

5. A circuit according to ~~any preceding claim~~¹ characterized in that the amplifier (152; 184) of the first (or last) stage (150, 152; 182, 184) comprises at least one transistor, that stage is of hybrid form and the transistor comprises a semiconductor die with no packaging disposed on the substrate on which the planar filter is implemented.

6. A circuit according to claim 5, characterized in that the stage (158, 160; 190, 192) farthest from the radiating means is in the form of an integrated circuit, for example an MMIC.

7. A circuit according to claim 6, characterized in that the radiating means are mobile, the first (or last) stage (150, 152; 182, 184) is also mobile and the stage implemented in the form of an integrated circuit is immobile.

8. A circuit according to ~~any preceding claim~~¹ characterized in that the substrate for the planar filter (150; 182) of the first (or last) stage (150, 152; 182, 184) has a matrix of a flexible organic material such as PTFE.

9. A circuit according to claim 8, characterized in that the substrate contains glass fibers for mechanical reinforcement and a dielectric, for example ceramic, filler.

10. A circuit according to ~~any preceding claim~~¹ characterized in that it includes three filter and amplifier stages (152, 154, 156, 158, 160; 182, 184, 186, 188, 190, 192) and the filter (158; 190) farthest from the radiating means has a higher attenuation than the

filters of the other two stages.

11. A circuit according to claims ~~5 and~~ 10, characterized in that the intermediate filter and amplifier stage (152, 154; 186, 188) is in hybrid form with a transistor comprising a semiconductor die with no packaging disposed on the substrate on which the planar filter is implemented.
12. A circuit according to claim 11, characterized in that the intermediate stage and the first (or last) stage (150, 152; 182, 184) are made on the same substrate.
13. A circuit according to ~~any preceding claim~~ characterized in that the amplifier (152; 184) of the first (or last) stage (150, 152; 182, 184) includes a field effect transistor (208) and in that a connecting wire (220) connected to the source forms a feedback inductor with a value chosen to minimize noise.
14. A circuit according to ~~any preceding claim~~ characterized in that receive frequencies are in the band from 11.7 GHz to 12.55 GHz and transmit frequencies are in the band from 14 GHz to 14.3 GHz.
15. A circuit according to ~~any preceding claim~~ characterized in that the microwaves transmitted and received are orthogonally polarized, in particular with circular polarizations in opposite directions.
16. A circuit according to ~~any preceding claim~~ characterized in that the planar filter is implemented in the microstrip or suspended triplate technology.
17. The use of the circuit according to ~~any preceding claim~~ to a terrestrial telecommunications system terminal which comprises a transceiver circuit for communicating

with another terrestrial terminal or a station providing services via a non-geostationary satellite.

18. A method of receiving (or transmitting) microwaves via radiating means, in which method filtering eliminates microwaves transmitted (or received) at different frequencies by the radiating means and the waves received (or to be transmitted) are amplified, characterized in that the filtering and amplification are progressive, the first (or last) filtering stage, starting from the radiating means, uses a planar filter whose rejectivity is a small fraction of that needed to eliminate transmit (or receive) frequencies throughout the corresponding system and the first (or last) stage amplifier gain is a small fraction of the total necessary gain.

19. A method according to claim 18, characterized in that the rejectivity of the first (or last) filter stage is determined as a function of the compression point of the amplifier (152; 184) of the first stage (150, 152; 182, 184) (or of the noise factor of the last stage of amplification), the power to be transmitted and the isolation between the two ports of the radiating means.